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# PATENT ABSTRACTS OF JAPAN

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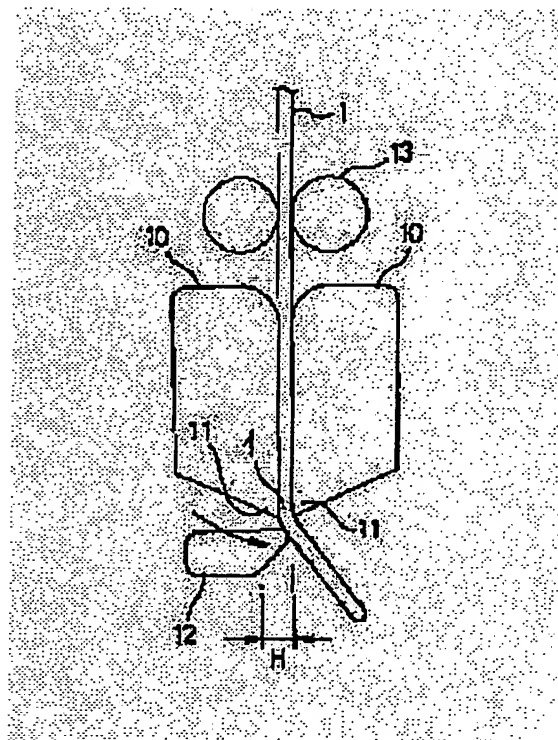
(72)Inventor : MIZUKAWA SUEHIRO

## (54) BEND-WORKING METHOD FOR METAL PLATE

(57)Abstract:

PURPOSE: To precisely bend a metal plate to a desired shape regardless of a skilled worker or an amateur.

CONSTITUTION: A metal plate 1 is intermittently sent out from the outlets 11 of die material 10, and when the metal plate 1 is stopped, a pushing tool 12 is made to move, the metal plate 1 is pushed against a tip part 11 on the outlet side of the die material 10, and is bent by a specific angle. In this case, the movement width H of the pushing tool 12 is made larger than the movement width corresponding to a bending angle after the restoration of the metal plate 1, considering a restoration quantity by the spring-back characteristic of the metal plate 1.



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CLAIMS

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[Claim(s)]

[Claim 1] When sending out a plate intermittently from the outlet of mold material and delivery of a plate are stopped By repeating, forcing the above-mentioned plate on the outlet side edge of the above-mentioned type material, and bending only a fixed angle, when only constant width moves a push implement Are the method of carrying out bending of the plate to a curve configuration as a whole, and the amount of restoration by the springback property of a plate is taken into consideration. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it The bending method of the plate characterized by obtaining the above-mentioned degree of the last corner of a street when the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property.

[Claim 2] When sending out intermittently using the mold material of the couple which can be adjusted from the outlet of the mold material of the couple which doubled the above-mentioned plate with the thickness size of the plate, and adjusted outlet width of face, and delivery of a plate are stopped so that a mutual interval may suit the thickness size of a plate By repeating, forcing the above-mentioned plate on the outlet side edge of the above-mentioned type material, and bending only a fixed angle, when only constant width moves a push implement Are the method of carrying out bending of the plate to a curve configuration as a whole, and the amount of restoration by the springback property of a plate is taken into consideration. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it The bending method of the plate characterized by obtaining the above-mentioned degree of the last corner of a street when the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property.

[Claim 3] When a plate is sent out from the outlet formed of the mold material of the couple using the mold material of the couple in which it was arranged by the phase opposite state and each outlet side edge sharpened in the shape of an acute angle and delivery of a plate is stopped When it is the bending method of the plate which forces the above-mentioned plate on the above-mentioned outlet side edge, and bends it by moving a push implement, and forcing a plate on the outlet side edge of mold material and bending it with a push implement The bending method of the plate characterized by moving the push implement to the above-mentioned outlet side edge from one side of the outlet side edge at the side else in accordance with the radii path covering the both sides of the outlet side edge of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne.

[Claim 4] The bending method of a plate that the above-mentioned degree of the last corner of a street is obtained when the plate bent by making larger than the move width of face corresponding to the degree of the last corner of a street of a plate move width of face of the push implement when taking into consideration the amount of restoration by the springback property of a plate, forcing a plate on the outlet side edge of mold material, and bending it in the bending method of the plate indicated to the claim 3 reverts with the springback property.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the method of carrying out bending of the plate to a desired angle.

[0002]

[Description of the Prior Art] By striking placing a plate on the reentrant of a dice and adjusting the plate to punch conventionally, when carrying out bending of the band-like plate, the work that a board could be dented to the inner direction of the above-mentioned reentrant was performed to several places of a plate, and the plate was incurvated as a whole and it had bent at the predetermined angle.

[0003] Moreover, the forming roller might be used.

[0004]

[Problem(s) to be Solved by the Invention] however, skill and skill advanced [ it is / a force degree when a plate can be struck and dented / difficult for the conventional method using a dice or punch, and ] although this carries out bending of the plate also to the springback possessing in the plate conjointly at the configuration as the original design -- needing -- anyone -- although -- there was a problem that it could not carry out easily

[0005] Moreover, the conventional method using a forming roller had the economical disadvantage that the forming roller which has a forming side according to the configuration had to be used, whenever the configurations which carry out bending differed.

[0006] This invention solves the above problem and an expert aims at offering a method with an amateur able to do bending of the plate to a desired configuration easily and quickly, of course as well as an expert.

[0007]

[Means for Solving the Problem] When sending out a plate intermittently from the outlet of mold material and delivery of a plate are stopped, invention concerning a claim 1 By repeating, forcing the above-mentioned plate on the outlet side edge of the above-mentioned type material, and bending only a fixed angle, when only constant width moves a push implement Are the method of carrying out bending of the plate to a curve configuration as a whole, and the amount of restoration by the springback property of a plate is taken into consideration. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it When the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, it is characterized by obtaining the above-mentioned degree of the last corner of a street.

[0008] From the outlet of the mold material of the couple which doubled the above-mentioned plate with the thickness size of the plate using the mold material of the couple which can be adjusted, and adjusted outlet width of face to invention concerning a claim 2 sending out intermittently so that a mutual interval may suit the thickness size of a plate By repeating forcing the above-mentioned plate on the outlet side edge of the above-mentioned type material, and bending only a fixed angle, when delivery of a plate is stopped, and only constant width moves a push implement Are the method of carrying out bending of the plate to a curve configuration as a whole, and the amount of restoration by the springback property of a plate is taken into consideration. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it When the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, it is characterized by obtaining the above-mentioned degree of the last corner of a street.

[0009] When invention concerning a claim 3 sends out a plate from the outlet formed of the mold material of the

couple using the mold material of the couple in which it was arranged by the phase opposite state and each outlet side edge sharpened in the shape of an acute angle and delivery of a plate is stopped When it is the bending method of the plate which forces the above-mentioned plate on the above-mentioned outlet side edge, and bends it by moving a push implement, and forcing a plate on the outlet side edge of mold material and bending it with a push implement It is characterized by moving the push implement to the above-mentioned outlet side edge from one side of the outlet side edge at the side else in accordance with the radii path covering the both sides of the outlet side edge of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne.

[0010] In the bending method of the plate which indicated invention concerning a claim 4 to the claim 3 The move width of face of the push implement when taking into consideration the amount of restoration by the springback property of a plate, forcing a plate on the outlet side edge of mold material, and bending it When the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, the above-mentioned degree of the last corner of a street is obtained.

[0011] According to the bending method of the plate by invention concerning a claim 1, the part where plates differ counters the outlet side edge of mold material one after another by sending out a plate intermittently from the outlet of mold material. Moreover, if the above-mentioned plate is forced on the outlet side edge of the above-mentioned type material when delivery of a plate is stopped, and only constant width moves a push implement, only the angle to which two or more places of the plate which countered the outlet side edge of mold material one after another as mentioned above balance the move width of face of the above-mentioned push implement will bend. Therefore, bending of the plate is carried out to a curve configuration as a whole by bending with 1 time of the folding angle of a plate, and controlling the number of times.

[0012] In this case, if the plate which was forced on the outlet side edge of mold material by the push implement, and was bent is released from the forcing operation by the push implement, it will be bent with the springback property with which the plate itself is equipped, and will carry out \*\*\*\* restoration behind. Therefore, the amount of restoration by the springback property of a plate is taken into consideration like this invention. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it If the above-mentioned degree of the last corner of a street is obtained when the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate (the degree of corner of a street after restoration) reverts with the springback property, bending of a curve configuration as wanted will become possible. Such an operation is done so also by the bending method of invention concerning a claim 2.

[0013] According to the bending method of the plate by invention concerning a claim 2, the following operations besides an above-mentioned operation are demonstrated. That is, since it can adjust so that the mutual interval of the mold material of a couple may suit the thickness size of a plate, bending of the plate of various thickness sizes can be coped with.

[0014] When according to the bending method of the plate by invention concerning a claim 3 forcing a plate on the outlet side edge of mold material and bending it with a push implement using the mold material of the couple in which it was arranged by the phase opposite state and each outlet side edge sharpened in the shape of an acute angle Since the push implement is moved to the above-mentioned outlet side edge from one side of the outlet side edge at the side else in accordance with the radii path covering the both sides of the outlet side edge of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne., the predetermined part of the plate which countered the outlet side edge of mold material can be bent at a larger angle than a right angle. Such an operation is done so also by the bending method of invention concerning a claim 4.

[0015] When bending the predetermined part of a plate at a larger angle than a right angle according to the bending method of the plate by invention concerning a claim 4 The move width of face of the push implement when taking into consideration the amount of restoration by the springback property of a plate, forcing a plate on the outlet side edge of mold material, and bending it Since the above-mentioned degree of the last corner of a street is obtained when the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, bending as wanted becomes possible.

[0016]

[Embodiments of the Invention] Drawing 1 - drawing 5 show the procedure of performing bending of this invention, using a band-like plate as symmetrical. In these drawings, 10 and 10 are the mold material of the \*\*\*\*\* (ed) couple, and have sharpened the outlet side edge 11 of each mold material 10 in the shape of an acute angle. Therefore, in the mold material 10 and 10 of the couple arranged by the phase opposite state, the outlet side edges 11 and 11 are taper configurations. These mold material 10 and 10 has come to be able to carry out increase and decrease of the mutual interval L of regulation. 12 is a push implement and is constituted possible [ approach

estrangement] along with radii path A-A illustrated to drawing 2 to the above-mentioned outlet side edge 11. That is, along with radii path A-A, it can move to the side else from one side of the outlet side edges 11 and 11, or can move to one side from a side besides the outlet side edges 11 and 11 along with the radii path A-A. 13 is a delivery roller which applies delivery to the workpiece 1-ed.

[0017] It performs sending above like drawing 1 and drawing 2, and only a predetermined angle rotating a roller 13, and sending out a plate 1 from the outlet 14 of the mold material 10 and 10, and adjusting the mutual interval L of the mold material 10 and 10 of a couple, and doubling with the thickness size t of a plate 1. By stopping, **\*(ing)**, pushing delivery of a plate 1 continuously in the place where predetermined part I of a plate 1 countered the above-mentioned outlet side edge 11, and moving an ingredient 12 rightward like drawing 3, a plate 1 is forced on the above-mentioned outlet side edge 11, and only a fixed angle bends above-mentioned part I. Then, while pushing like drawing 4 and retreating an ingredient 12 to the original position, only a predetermined angle rotates the delivery roller 13, send out a plate 1, part RO which separated only predetermined width of face from already bent part I is made to counter the above-mentioned outlet side edge 11, and delivery is stopped. And by moving the push implement 12 rightward again, a plate 1 is forced on the above-mentioned outlet side edge 11 like drawing 5, and only a fixed angle is bent. If the above operation is repeated, a plate 1 will be bent by two or more predetermined interval every places. And when [ of bending part I and RO - ] an interval is comparatively narrow, bending is carried out to a curve configuration as a whole, and when extensive **\*\*** is in the interval, bending of several places which separated the interval is carried out, respectively.

[0018] If move width of face H of the push implement 12 is fixed in the above-mentioned method, they will be each bending part I of a plate 1, and RO. - 1 time of a folding angle becomes the same. Moreover, if intermittent-feed width of face D of the plate 1 with the delivery roller 13 is fixed, they will be each bending part I and RO. - A mutual interval becomes the same. From this, in forming a part for a circular bend as a whole by bending While deciding the above-mentioned intermittent-feed width of face D that the part which carried out the division-into-equal-parts rate of the all-over-the-districts portion which performs bending of a plate 1 counters the above-mentioned outlet side edge 11 one after another If it bends from the folding angle of the plate 1 bent by one forcing of the push implement 12, and the radius of curvature for a bend to form by bending and the number of times is computed, it will become possible about both element of these to perform bending of a curve configuration exact as a factor.

[0019] By the way, if the forcing operation of the push implement 12 to the plate 1 is canceled by the springback property with which the plate 1 is equipped when a plate 1 is bent, the folding part of a plate 1 will carry out **\*\*\*\*** restoration, and it will open. If the degree of corner of a street when a plate 1 reverts with a springback property is made the degree of the last corner of a street here, in order to perform bending of a curve configuration as wanted The move width of face H of the push implement 12 when taking the springback property of a plate 1 into consideration, forcing a plate 1 on the outlet side edge 11 of the mold material 10, and bending it When the plate 1 bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate 1 reverts with the springback property, it requires that the above-mentioned degree of the last corner of a street is obtained. Such technique is adopted about the example explained by drawing 1 - drawing 5.

[0020] Next, when carrying out bending of the plate 1 right-angled, it faces it being required to enlarge move width of face H of the push implement 12, and performing such right-angled bending, the outlet side edges 11 and 11 of the mold material 10 and 10 of a couple have become a taper configuration, and it is useful to be constituted so that the push implement 12 may move to the side else from one side of the outlet side edge 11 along with radii path A-A. Namely, since the plate 1 bends with a springback property and carries out **\*\*\*\*** restoration behind, when a plate 1 is bent, when forcing a plate 1 on the outlet side edge 11 of the mold material 10 and bending it with the push implement 12 If take the springback property of a plate 1 into consideration, the push implement 12 is further moved to **\*\*\*\*** facing up after passing through the bottom of the above-mentioned outlet side edge 11, a plate 1 is pushed and it bends to an acute angle smaller than a right angle with an ingredient 12 It is because a plate 1 reverts right-angled with a springback property after the push implement 12 retreats. In this case, a right angle is the degree of the last corner of a street.

[0021] Drawing 6 shows a part for the bend of the plate 1 by which bending was carried out as a whole to the curve configuration by the technique explained by drawing 1 - drawing 5. In this drawing, the aperture angle of the both ends for a circular bend in which A was formed of bending, and a are the aperture angles between bending parts, and this is an angle for one when carrying out the division-into-equal-parts rate of the above-mentioned aperture angle A. Moreover, r is the radius of curvature for a bend.

[0022] Drawing 7 is what illustrated the mechanism for adjusting the mutual interval of the mold material 10 and 10

of a couple. It is the thing which the inside screwed in each of the both ends of the flat mold material 10 and 10 and which it \*\*\*\*ed, and shafts 20 and 21 were interlocked with the chain 22, and connected the manipulator style 23 with one screw-thread shaft 20. It has the composition that the mold material 10 and 10 of a couple is approached or estranged, by \*\*\*\*ing by the manipulator style 23 and making the right direction or an opposite direction rotate shafts 20 and 21. 25 is the mount of the screw-thread shafts 20 and 21.

[0023]

[Effect of the Invention] Like the above explanation, not using a dice and punch, without using the forming roller which has the forming side of a configuration variously, according to the bending method of the plate invention concerning a claim 1 or a claim 2, bending can be carried out now easily for the curve configuration of a request of a plate, and correctly, and, moreover, not only an expert but the amateur who has not received special training can perform the bending now correctly. Moreover, since it can carry out controlling bending by the computer, in the former, there is an advantage which can also perform now bending of a complicated configuration which is extremely accompanied by difficulty. The move width of face of the push implement when taking into consideration the amount of restoration by the springback property of a plate, forcing a plate on the outlet side edge of mold material, and bending it especially Since the technique the above-mentioned degree of the last corner of a street is obtained is adopted when the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property The degree of corner of a street as a design can be made to the degree of the last corner of a street of each part with a sufficient precision at the beginning.

[0024] Moreover, since the bending method of the plate invention concerning a claim 2 can adjust the mutual interval of the mold material of a couple so that the thickness size of a plate may be suited, bending can be performed now to the plate of various thickness sizes, and the versatility increases.

[0025] In the bending method of the plate invention concerning a claim 3 or a claim 4 Since the push implement is moved to the above-mentioned outlet side edge from one side of the outlet side edge at the side else in accordance with the radii path covering the both sides of the outlet side edge of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne. when forcing a plate on the outlet side edge of the taper configuration of mold material and bending it with a push implement It becomes possible to carry out bending of the plate to a larger angle than a right angle and a right angle, without using the forming roller which has the forming side of a configuration variously, not using a dice and punch, and, moreover, not only an expert but the amateur who has not received special training can perform the bending now correctly. Moreover, there is also an advantage which can be performed while controlling bending by the computer. According to the bending method of the plate invention which relates to a claim 4 especially, the amount of restoration by the springback property of a plate is taken into consideration. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it Since the technique the above-mentioned degree of the last corner of a street is obtained is adopted when the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property The degree of corner of a street as a design can be made to the degree of the last corner of a street of each part with a sufficient precision at the beginning.

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TECHNICAL FIELD

Technical field to which invention belongs] This invention relates to the method of carrying out bending of  
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**PRIOR ART**

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[Description of the Prior Art] By striking placing a plate on the reentrant of a dice and adjusting the plate to punch conventionally, when carrying out bending of the band-like plate, the work that a board could be dented to the inner direction of the above-mentioned reentrant was performed to several places of a plate, and the plate was incurvated as a whole and it had bent at the predetermined angle.

[0003] Moreover, the forming roller might be used.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] Like the above explanation, not using a dice and punch, without using the forming roller which has the forming side of a configuration variously, according to the bending method of the plate invention concerning a claim 1 or a claim 2, bending can be carried out now easily for the curve configuration of a request of a plate, and correctly, and, moreover, not only an expert but the amateur who has not received special training can perform the bending now correctly. Moreover, since it can carry out controlling bending by the computer, in the former, there is an advantage which can also perform now bending of a complicated configuration which is extremely accompanied by difficulty. Especially, the amount of restoration by the springback property of a plate is taken into consideration, and move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it is made larger than the move width of face corresponding to the degree of the last corner of a street of a plate. Since the technique the above-mentioned degree of the last corner of a street is obtained is adopted when the bent plate reverts with the springback property, the degree of corner of a street as a design can be made to the degree of the last corner of a street of each part with a sufficient precision at the beginning.

[0024] Moreover, since the bending method of the plate invention concerning a claim 2 can adjust the mutual interval of the mold material of a couple so that the thickness size of a plate may be suited, bending can be performed now to the plate of various thickness sizes, and the versatility increases.

[0025] In the bending method of the plate invention concerning a claim 3 or a claim 4 Since the push implement is moved to the above-mentioned outlet side edge from one side of the outlet side edge at the side else in accordance with the radii path covering the both sides of the outlet side edge of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne. when forcing a plate on the outlet side edge of the taper configuration of mold material and bending it with a push implement It becomes possible to carry out bending of the plate to a larger angle than a right angle and a right angle, without using the forming roller which has the forming side of a configuration variously, not using a dice and punch, and, moreover, not only an expert but the amateur who has not received special training can perform the bending now correctly. Moreover, there is also an advantage which can be performed while controlling bending by the computer. According to the bending method of the plate invention which relates to a claim 4 especially, the amount of restoration by the springback property of a plate is taken into consideration. Since the technique the above-mentioned degree of the last corner of a street is obtained is adopted when the plate bent by making move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, the degree of corner of a street as a design can be made to the degree of the last corner of a street of each part with a sufficient precision at the beginning.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] however, skill and skill advanced [ it is / a force degree when a plate can be struck and dented / difficult for the conventional method using a dice or punch, and ] although this carries out bending of the plate also to the springback possessing in the plate conjointly at the configuration as the original design -- needing -- anyone -- although -- there was a problem that it could not carry out easily [0005] Moreover, the conventional method using a forming roller had the economical disadvantage that the forming roller which has a forming side according to the configuration had to be used, whenever the configurations which carry out bending differed.

[0006] This invention solves the above problem and an expert aims at offering a method with an amateur able to do bending of the plate to a desired configuration easily and quickly, of course as well as an expert.

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**MEANS**

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[Means for Solving the Problem] When sending out a plate intermittently from the outlet of mold material and delivery of a plate are stopped, invention concerning a claim 1 By repeating, forcing the above-mentioned plate on the outlet side edge of the above-mentioned type material, and bending only a fixed angle, when only constant width moves a push implement Are the method of carrying out bending of the plate to a curve configuration as a whole, and the amount of restoration by the springback property of a plate is taken into consideration. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it When the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, it is characterized by obtaining the above-mentioned degree of the last corner of a street.

[0008] From the outlet of the mold material of the couple which doubled the above-mentioned plate with the thickness size of the plate using the mold material of the couple which can be adjusted, and adjusted outlet width of face to invention concerning a claim 2 sending out intermittently so that a mutual interval may suit the thickness size of a plate By repeating forcing the above-mentioned plate on the outlet side edge of the above-mentioned type material, and bending only a fixed angle, when delivery of a plate is stopped, and only constant width moves a push implement Are the method of carrying out bending of the plate to a curve configuration as a whole, and the amount of restoration by the springback property of a plate is taken into consideration. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it When the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, it is characterized by obtaining the above-mentioned degree of the last corner of a street.

[0009] When invention concerning a claim 3 sends out a plate from the outlet formed of the mold material of the couple using the mold material of the couple in which it was arranged by the phase opposite state and each outlet side edge sharpened in the shape of an acute angle and delivery of a plate is stopped When it is the bending method of the plate which forces the above-mentioned plate on the above-mentioned outlet side edge, and bends it by moving a push implement, and forcing a plate on the outlet side edge of mold material and bending it with a push implement It is characterized by moving the push implement to the above-mentioned outlet side edge from one side of the outlet side edge at the side else in accordance with the radii path covering the both sides of the outlet side edge of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne.

[0010] In the bending method of the plate which indicated invention concerning a claim 4 to the claim 3 The move width of face of the push implement when taking into consideration the amount of restoration by the springback property of a plate, forcing a plate on the outlet side edge of mold material, and bending it When the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, the above-mentioned degree of the last corner of a street is obtained.

[0011] According to the bending method of the plate by invention concerning a claim 1, the part where plates differ counters the outlet side edge of mold material one after another by sending out a plate intermittently from the outlet of mold material. Moreover, if the above-mentioned plate is forced on the outlet side edge of the above-mentioned type material when delivery of a plate is stopped, and only constant width moves a push implement, only the angle to which two or more places of the plate which countered the outlet side edge of mold material one after another as mentioned above balance the move width of face of the above-mentioned

push implement will bend. Therefore, bending of the plate is carried out to a curve configuration as a whole by bending with 1 time of the folding angle of a plate, and controlling the number of times.

[0012] In this case, if the plate which was forced on the outlet side edge of mold material by the push implement, and was bent is released from the forcing operation by the push implement, it will be bent with the springback property with which the plate itself is equipped, and will carry out \*\*\*\* restoration behind.

Therefore, the amount of restoration by the springback property of a plate is taken into consideration like this invention. The move width of face of the push implement when forcing a plate on the outlet side edge of mold material, and bending it If the above-mentioned degree of the last corner of a street is obtained when the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate (the degree of corner of a street after restoration) reverts with the springback property, bending of a curve configuration as wanted will become possible. Such an operation is done so also by the bending method of invention concerning a claim 2.

[0013] According to the bending method of the plate by invention concerning a claim 2, the following operations besides an above-mentioned operation are demonstrated. That is, since it can adjust so that the mutual interval of the mold material of a couple may suit the thickness size of a plate, bending of the plate of various thickness sizes can be coped with.

[0014] When according to the bending method of the plate by invention concerning a claim 3 forcing a plate on the outlet side edge of mold material and bending it with a push implement using the mold material of the couple in which it was arranged by the phase opposite state and each outlet side edge sharpened in the shape of an acute angle Since the push implement is moved to the above-mentioned outlet side edge from one side of the outlet side edge at the side else in accordance with the radii path covering the both sides of the outlet side edge of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne., the predetermined part of the plate which countered the outlet side edge of mold material can be bent at a larger angle than a right angle. Such an operation is done so also by the bending method of invention concerning a claim 4.

[0015] When bending the predetermined part of a plate at a larger angle than a right angle according to the bending method of the plate by invention concerning a claim 4 The move width of face of the push implement when taking into consideration the amount of restoration by the springback property of a plate, forcing a plate on the outlet side edge of mold material, and bending it Since the above-mentioned degree of the last corner of a street is obtained when the plate bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate reverts with the springback property, bending as wanted becomes possible.

[0016]

[Embodiments of the Invention] Drawing 1 - drawing 5 show the procedure of performing bending of this invention, using a band-like plate as symmetrical. In these drawings, 10 and 10 are the mold material of the \*\* \*(ed) couple, and have sharpened the outlet side edge 11 of each mold material 10 in the shape of an acute angle. Therefore, in the mold material 10 and 10 of the couple arranged by the phase opposite state, the outlet side edges 11 and 11 are taper configurations. These mold material 10 and 10 has come to be able to carry out increase and decrease of the mutual interval L of regulation. 12 is a push implement and is constituted possible [ approach estrangement ] along with radii path A-A illustrated to drawing 2 to the above-mentioned outlet side edge 11. That is, along with radii path A-A, it can move to the side else from one side of the outlet side edges 11 and 11, or can move to one side from a side besides the outlet side edges 11 and 11 along with the radii path A-A. 13 is a delivery roller which applies delivery to the workpiece 1-ed.

[0017] It performs sending above like drawing 1 and drawing 2 , and only a predetermined angle rotating a roller 13, and sending out a plate 1 from the outlet 14 of the mold material 10 and 10, and adjusting the mutual interval L of the mold material 10 and 10 of a couple, and doubling with the thickness size t of a plate 1. By stopping, \*(ing), pushing delivery of a plate 1 continuously in the place where predetermined part I of a plate 1 countered the above-mentioned outlet side edge 11, and moving an ingredient 12 rightward like drawing 3 , a plate 1 is forced on the above-mentioned outlet side edge 11, and only a fixed angle bends above-mentioned part I. Then, while pushing like drawing 4 and retreating an ingredient 12 to the original position, only a predetermined angle rotates the delivery roller 13, send out a plate 1, part RO which separated only predetermined width of face from already bent part I is made to counter the above-mentioned outlet side edge 11, and delivery is stopped. And by moving the push implement 12 rightward again, a plate 1 is forced on the

above-mentioned outlet side edge 11 like drawing 5 , and only a fixed angle is bent. If the above operation is repeated, a plate 1 will be bent by two or more predetermined interval every places. And when [ of bending part I and RO -- ] an interval is comparatively narrow, bending is carried out to a curve configuration as a whole, and when extensive \*\* is in the interval, bending of several places which separated the interval is carried out, respectively.

[0018] If move width of face H of the push implement 12 is fixed in the above-mentioned method, they will be each bending part I of a plate 1, and RO. -- 1 time of a folding angle becomes the same. Moreover, if intermittent-feed width of face D of the plate 1 with the delivery roller 13 is fixed, they will be each bending part I and RO. -- A mutual interval becomes the same. From this, in forming a part for a circular bend as a whole by bending While deciding the above-mentioned intermittent-feed width of face D that the part which carried out the division-into-equal-parts rate of the all-over-the-districts portion which performs bending of a plate 1 counters the above-mentioned outlet side edge 11 one after another If it bends from the folding angle of the plate 1 bent by one forcing of the push implement 12, and the radius of curvature for a bend to form by bending and the number of times is computed, it will become possible about both element of these to perform bending of a curve configuration exact as a factor.

[0019] By the way, if the forcing operation of the push implement 12 to the plate 1 is canceled by the springback property with which the plate 1 is equipped when a plate 1 is bent, the folding part of a plate 1 will carry out \*\*\*\* restoration, and it will open. If the degree of corner of a street when a plate 1 reverts with a springback property is made the degree of the last corner of a street here, in order to perform bending of a curve configuration as wanted The move width of face H of the push implement 12 when taking the springback property of a plate 1 into consideration, forcing a plate 1 on the outlet side edge 11 of the mold material 10, and bending it When the plate 1 bent by making it larger than the move width of face corresponding to the degree of the last corner of a street of a plate 1 reverts with the springback property, it requires that the above-mentioned degree of the last corner of a street is obtained. Such technique is adopted about the example explained by drawing 1 - drawing 5 .

[0020] Next, when carrying out bending of the plate 1 right-angled, it faces it being required to enlarge move width of face H of the push implement 12, and performing such right-angled bending, the outlet side edges 11 and 11 of the mold material 10 and 10 of a couple have become a taper configuration, and it is useful to be constituted so that the push implement 12 may move to the side else from one side of the outlet side edge 11 along with radii path A-A. Namely, since the plate 1 bends with a springback property and carries out \*\*\*\* restoration behind, when a plate 1 is bent, when forcing a plate 1 on the outlet side edge 11 of the mold material 10 and bending it with the push implement 12 If take the springback property of a plate 1 into consideration, the push implement 12 is further moved to \*\*\*\* facing up after passing through the bottom of the above-mentioned outlet side edge 11, a plate 1 is pushed and it bends to an acute angle smaller than a right angle with an ingredient 12 It is because a plate 1 reverts right-angled with a springback property after the push implement 12 retreats. In this case, a right angle is the degree of the last corner of a street.

[0021] Drawing 6 shows a part for the bend of the plate 1 by which bending was carried out as a whole to the curve configuration by the technique explained by drawing 1 - drawing 5 . In this drawing, the aperture angle of the both ends for a circular bend in which A was formed of bending, and a are the aperture angles between bending parts, and this is an angle for one when carrying out the division-into-equal-parts rate of the above-mentioned aperture angle A. Moreover, r is the radius of curvature for a bend.

[0022] Drawing 7 is what illustrated the mechanism for adjusting the mutual interval of the mold material 10 and 10 of a couple. It is the thing which the inside screwed in each of the both ends of the flat mold material 10 and 10 and which it \*\*\*\*ed, and shafts 20 and 21 were interlocked with the chain 22, and connected the manipulator style 23 with one screw-thread shaft 20. It has the composition that the mold material 10 and 10 of a couple is approached or estranged, by \*\*\*\*ing by the manipulator style 23 and making the right direction or an opposite direction rotate shafts 20 and 21. 25 is the mount of the screw-thread shafts 20 and 21.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] When carrying out bending of the plate, it is explanatory drawing showing the initial stage.

[Drawing 2] When carrying out bending of the plate, it is explanatory drawing showing other initial stages.

[Drawing 3] When carrying out bending of the plate, it is explanatory drawing of the stage where pushed on the plate and the ingredient was pushed.

[Drawing 4] When carrying out bending of the plate, it is explanatory drawing of the stage where the forcing operation of a push implement to a plate was released.

[Drawing 5] When carrying out bending of the plate, it is explanatory drawing of the stage where pushed on other parts of a plate and the ingredient was pushed.

[Drawing 6] It is the side elevation showing a part for the bend of the plate by which bending was carried out according to the procedure of drawing 1 - drawing 5.

[Drawing 7] It is the plan which illustrated the mechanism for adjusting the mutual interval of the mold material of a couple.

[Description of Notations]

1 Plate

10 Mold Material

11 Outlet Side Edge

12 Push Implement

14 Outlet of Mold Material

A-A Radii path

L The mutual interval of mold material

H Move width of face of a push implement

t The thickness size of a plate

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[Translation done.]

**\* NOTICES \***

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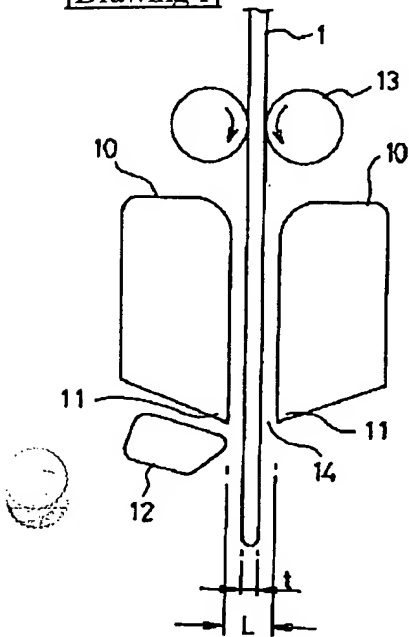
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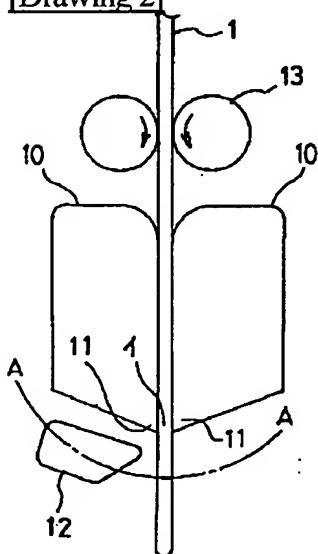
**DRAWINGS**

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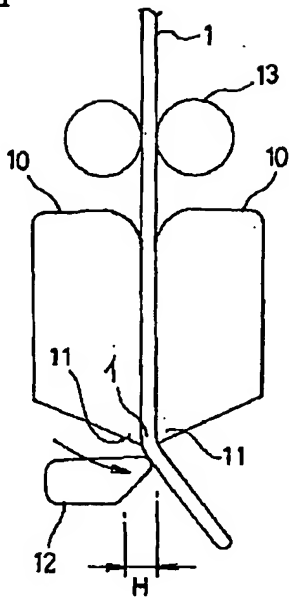
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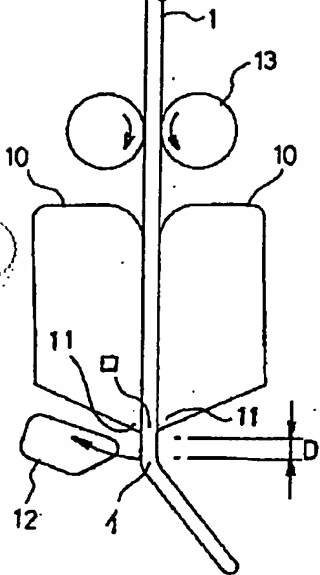
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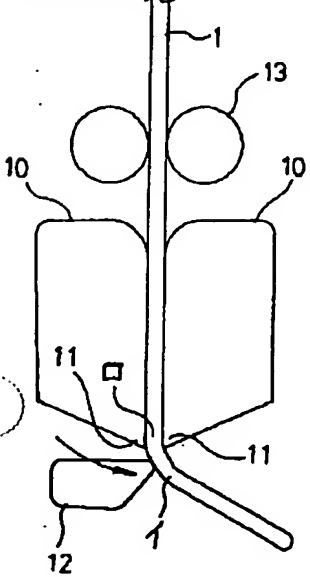
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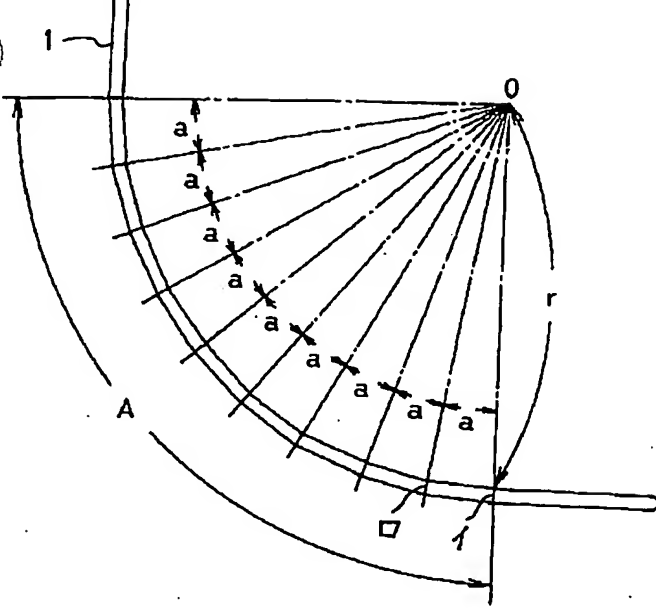
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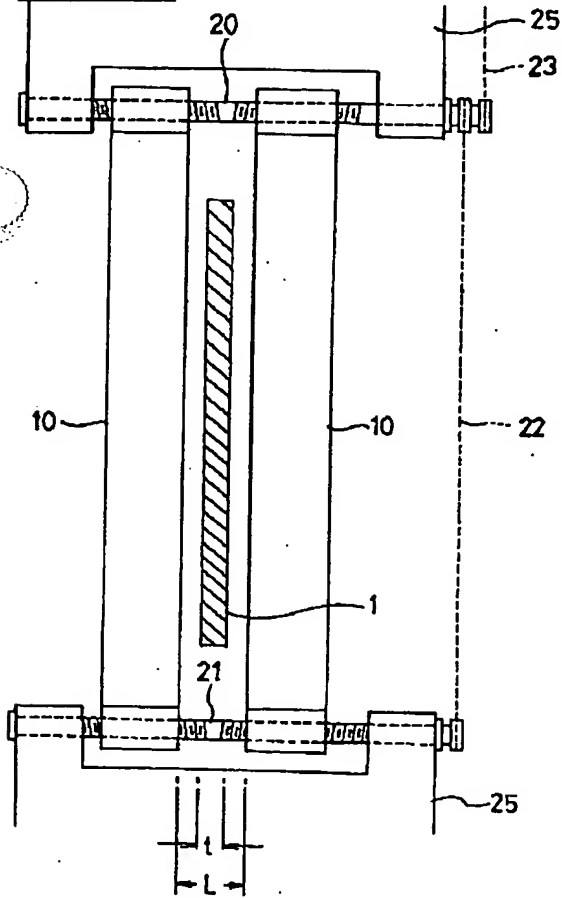
[Drawing 5]



[Drawing 6]



[Drawing 7]



[translation done.]